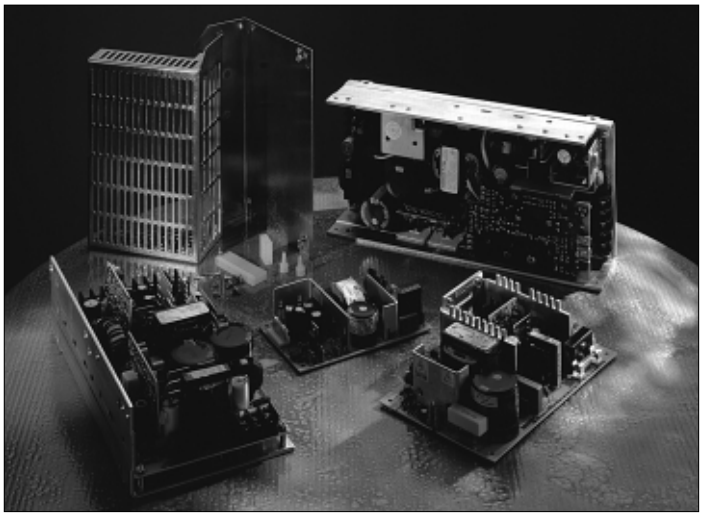
Universal AC Input Switchers

NFS SERIES

25-110 Watts



- CE Marked - LVD
- 85 - 264 V AC Universal Input
- Single, Dual, Triple & Quad Outputs
- Optional Safety Covers
- Medical Approved Versions
- High Reliability
- International Safety Approvals

SPECIFICATION

Input voltage	• 85-264 V AC (120-370 V DC)
Input Frequency	• 47-440 Hz
Inrush Current	• 32 A max at 230 V AC input on 'cold start'
Hold Up Time	• 75 ms typical at 240 V AC max load
Output Voltage	• See Table, main output and some auxiliary outputs adjustable (not NFS25)
Line Regulation	• NFS 25 ±0.2% (1% O/P B), NFS 40/75 ±0.5%, NFS 42/50 ±0.3%, NFS 80/110 ±0.1%
Load Regulation	• See Tables
Ripple and Noise	• See Tables
Short Circuit and Overload Protection	• Overall Power Limit
Overvoltage Protection	• On + 5 V output and single output - shuts unit down
Efficiency	• 70% typical
Operating Temperature	• 0 °C to +70 ºC Derate above +50 ºC @ 2.5%/ºC NFS 110 requires forced air cooling see Table
Storage Temperature	• -40 °C to +85 ºC
Temperature Coefficient	• 0.02%/ºC
Relative Humidity	• 5 to 95% non condensing
Vibration	• 0.75 G pk over 5 Hz to 500 Hz for 5 min on 3 axis.
EMC	• FCC, VDE 0871 curve B, NFS 42, 50, 80 & 110, EN55022 curve B conducted noise FCC, VDE 0871 curve A, NFS 25, 40, 75, & 110, medical spec.
Safety Approvals (standard models)	• UL1950 recognised, CSA certified, LVD compliant EN60590/IEC950/IEC1010 approved (NFS75 not IEC1010) BS6301 approved - most models, contact office for file numbers
Safety Approvals (medical models)	• UL2601 (NFS40 & NFS110), UL544 (NFS50), patient connect applications CSA22.2 - 125 certified - File No 41062, patient connect applications IEC 601/VDE 0750 - File No 2559 (NFS40), 2874(NFS110), non critical non patient connect applications.
MTBF	• See Notes on each model

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OUTPUT VOLTAGE & CURRENT RATINGS - 25 AND 40 W MODELS

Output Power	Output Voltage	Output Currents				Ripple	Total	Model Number
		Minimum[10][11]	Maximum[1]	Maximum[2]	Peak[3]	P-P[4]	Regulation[5]	
25 W	+5.1 V (A)	0 A	2.00 A	-	5.0 A	50 mV	±2%	**NFS25-7608**
	+12.0 V (B)	0 A	1.50 A	-	3.0 A	120 mV	±5%	
	–12.0 V	0 A	0.20 A	-	-	120 mV	±5%	
25 W	+5.1 V	0 A	2.00 A	-	5.0 A	50 mV	±2%	NFS25-7628[6]
	+12.0 V	0 A	0.20 A	-	1.0 A	120 mV	±2%	
	–12.0 V	0 A	0.20 A	-	-	120 mV	±2%	
25 W	+5.1 V (A)	0 A	2.00 A	-	5.0 A	50 mV	±2%	NFS25-7629
	+12.0 V (B)	0 A	1.50 A	-	3.0 A	120 mV	±5%	
40 W	+5.1 V (A)	0 A	3.00 A	5.00 A	7.0 A	50 mV	±2%	NFS40-7607
	+12.0 V (B)	0 A	2.00 A	2.00 A	3.0 A	120 mV	±5%	
	–5.0 V	0 A	0.35 A	0.50 A	-	50 mV	±5%	
40 W	+5.1 V (A)	0 A	3.00 A	5.00 A	7.0 A	50 mV	±2%	**NFS40-7608****
	+12.0 V (B)	0 A	2.00 A	2.00 A	3.0 A	120 mV	±5%	
	–12.0 V	0 A	0.35 A	0.50 A	-	120 mV	±5%	
40 W	+5.0 V	0 A	4.00 A	5.00 A	7.0 A	50 mV	±2%	NFS40-7628[6]
	+12.0 V	0 A	0.35 A	0.50 A	-	120 mV	±5%	
	–12.0 V	0 A	0.35 A	0.50 A	-	120 mV	±5%	
40 W	+5.0 V (A)	0 A	3.00 A	5.00 A	7.0 A	50 mV	±2%	**NFS40-7610****
	+15.0 V (B)	0 A	2.00 A	2.00 A	2.5 A	150 mV	+10%/–3%	
	–15.0 V	0 A	0.35 A	0.50 A	-	150 mV	±5%	
40 W	+5.0 V	0 A	6.00 A	8.00 A	12.0 A	100 mV	±2%	**NFS40-7605****
40 W	+12.0 V	0 A	3.30 A	4.00 A	5.0 A	120 mV	±2%	**NFS40-7612****
40 W	+15.0 V	0 A	2.60 A	3.30 A	4.0 A	150 mV	±2%	**NFS40-7615****
40 W	+24.0 V	0 A	1.60 A	2.00 A	2.5 A	240 mV	±2%	**NFS40-7624****

**** Medical Approved versions available - replace - 76xx with - 79xx**

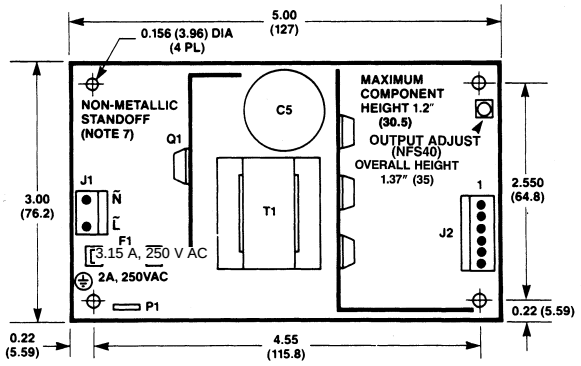
1. Natural convection cooled.
2. Forced air, 20 CFM at 1 atmosphere, 50 W maximum.
3. NFS 25 - Peak output current lasting less than 60 seconds with duty cycle less than 5%.
   NFS 40 - Peak output current lasting less than 30 seconds with duty cycle less than 10%.
   During peak loading, outputs may go outside of total regulation limits.
4. 50 MHz bandwidth, peak to peak, measured differentially.
5. Total Regulation is defined as the static output regulation at 25 °C, including initial tolerance, line voltage within stated limits, load currents within stated limits, and output voltages adjusted to their factory
   settings. Also, 0.5≤I(A)/I(B)≤3 for NFS 25 and 0.25≤ I(A)/I(B) ≤5 for NFS 40 to maintain stated regulation.
6. The NFS25&40-7628 have a separately regulated +12 V output. The loading condition in note (5) does not apply.
7. In order to meet VDE safety requirements, a non-metallic standoff is mandatory for one hole as specified in the mechanical drawing (below).
8. The ground pad of the mounting hole near P1 allows system grounding through a metal standoff.
9. To improve EMI/RFI Conducted noise, the ground pad of the mounting hole near the output connector should be connected with the ground pad of the mounting hole near P1. Use metal standoffs attached to a common metal chassis. This connection also significantly attenuates common mode noise.
10. MTBF 170,00 Hrs to MIL217E with 4w min load.
11. A min load of 0.5 A required on +5 output to obtain full current from the negative output.

PIN CONNECTIONS

J1	NFS25-7608/28/29	NFS40-7607/8/28	NFS40-7610	NFS40-7605	NFS40-7612	NFS40-7615	NFS40-7624
Pin 1	AC Live	AC Live	AC Live	AC Live	AC Live	AC Live	AC Live
Pin 2	AC Neutral	AC Neutral	AC Neutral	AC Neutral	AC Neutral	AC Neutral	AC Neutral
J2							
Pin 1	+12 V	+12 V	+15 V	+5 V	+12 V	+15 V	+24 V
Pin 2	+5 V	+5 V	+5 V	+5 V	+12 V	+15 V	+24 V
Pin 3	+5 V	+5 V	+5 V	+5 V	+12 V	+15 V	+24 V
Pin 4	Return	Return	Return	Return	Return	Return	Return
Pin 5	Return	Return	Return	Return	Return	Return	Return
Pin 6	–12 V (NC/29)	–5 V/–12 V	–15 V	Return	Return	Return	Return
P1							
Pin 1	Safety Earth Ground						

MECHANICAL DETAILS - 25 & 40 WATT MODELS

1. Other output voltage versions available. Consult office for details.
2. AC mating connector is Molex 09-50-3031 with Molex 08-50-0105 crimp terminal. DC mating connector is Molex 09-91-0600 with Molex 08-50-0105 crimp terminal.
3. Mating connector kits available, order Part No. **25/40W CON KIT**
4. No minimum load is required for operation, see 10 & 11 above.
5. Power sharing between outputs is possible, contact sales office for details.
6. A standard L-bracket and cover is available for mounting which contains all screws, connectors and necessary hardware.



OUTPUT VOLTAGE & CURRENT RATINGS - 40 & 50 W MODELS

Output Power	Output Voltage	Output Currents				Ripple	Total	Model Number
		Minimum[6]	Maximum[1]	Maximum[2]	Peak[3]	Pk-Pk[4]	Regulation[5]	
40 W	+5.1 V (I_1)	0 A	2.5 A	3.5 A	5.0 A	50 mV	±3%	**NFS42-7608**
	+12 V (I_2)	0 A	2.0 A	2.5 A	4.0 A	120 mV	±5%	
	–12 V	0 A	0.2 A	0.3 A	0.7 A	120 mV	±5%	
40 W	+5.1 V (I_1)	0 A	2.5 A	3.5 A	5.0 A	50 mV	±3%	NFS42-7627
	+24 V (I_2)	0 A	1.0 A	1.2 A	3.0 A	240 mV	±5%	
	–12 V	0 A	0.2 A	0.3 A	0.7 A	120 mV	±5%	
40 W	+5.1 V (I_1)	0 A	2.5 A	3.5 A	5.0 A	50 mV	±3%	**NFS42-7610**
	+15 V (I_2)	0 A	1.6 A	2.0 A	3.0 A	150 mV	±5%	
	–15 V	0 A	0.2 A	0.3 A	0.7 A	150 mV	±5%	
50 W	+5.1 V (I_1)	0 A	5.0 A	7.0 A	7.0 A	50 mV	±2.5%	**NFS50-7608****
	+12 V (I_2)	0 A	2.0 A	2.5 A	5.0 A	120 mV	±5%	
	–12 V	0 A	0.5 A	0.7 A	1.0 A	120 mV	±5%	
50 W	+5.1 V (I_1)	0 A	5.0 A	7.0 A	7.0 A	50 mV	±2.5%	**NFS50-7608M**
	+12 V (I_2)	0 A	2.0 A	2.5 A	5.0 A	120 mV	±5%	
	12 V isolated	0 A	0.5 A	0.7 A	1.0 A	120 mV	±5%	
50 W	+5.1 V (I_1)	0 A	4.5 A	5.5 A	6.5 A	50 mV	±2.5%	NFS50-7610
	+15 V (I_2)	0 A	1.0 A	1.5 A	2.0 A	120 mV	±5%	
	–15 V	0 A	0.6 A	0.8 A	1.0 A	120 mV	±5%	
50 W	+5.1 V (I_1)	0 A	5.0 A	7.0 A	7.0 A	50 mV	±2.5%	NFS50-7601
	+12 V (I_2)	0 A	2.0 A	2.5 A	5.0 A	120 mV	±5%	
	–12 V	0 A	0.5 A	0.7 A	1.0 A	120 mV	±5%	
	–5 V	0 A	0.5 A	0.5 A	0.5 A	90 mV	±5%	

** Medical approved version available – model no. NFS50-7908

1. Convection Cooled.
2. Forced Air, 20 CFM at 1 Atmosphere.
3. Peak outputs lasting less than one minute with duty factor less than 5%. During peak loading, output may go outside of total regulation limits.
4. 50 MHz bandwidth, peak to peak, measured differentially.
5. Total Regulation is defined as the static output regulation at 25 °C including initial tolerance, line voltage within stated limits, load currents within stated limits, and output voltages adjusted to their factory setting.
5. (continued) To achieve stated regulation following applies:
   NFS 42-7608 : $0.25 \leq \mathbf{x} \leq 5$
   NFS 42-7627 : $0.5 \leq \mathbf{x} \leq 12$
   NFS 42-7610 : $0.3 \leq \mathbf{x} \leq 12$
   NFS 50-7608/08M : $\mathbf{x} \leq 5$
   NFS 50-7610/01 : $\mathbf{x} \leq 5$
   where $\mathbf{x} = \frac{I_1}{I_2}$
6. MTBF 230,000 hrs (NFS 42), 160,000 hrs (NFS 50) with 5 W min load

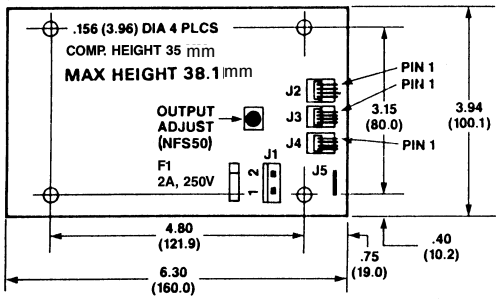
MECHANICAL DETAILS – 40 & 50 WATT MODELS

Pin Connections

J1	NFS42-7608 NFS50-7608	NFS42-7627 –	NFS42-7610 NFS50-7610
Pin 1	AC Live	AC Live	AC Live
Pin 2	AC Neutral	AC Neutral	AC Neutral
J2, J3, J4			
Pin 1	–12 V	–12 V	–15 V
Pin 2	+12 V	+24 V	+15 V
Pin 3	Return	Return	Return
Pin 4	+5 V	+5 V	+5 V
J5			
Pin 1	Ground	Ground	Ground

Safety Covers available

NFS42 – 7608/10/27, NFS50 – 7608/10



AC Mating Connector – Molex 09-50-3031 with Molex 08-50-0105 crimp terminal
DC Mating Connector – Molex 22-01-1403 with Molex 08-50-0031 crimp terminal
Mating Connector kit available, order Part No. **NFS42/50 CON KIT**

Alternative Connector for NFS50-7608

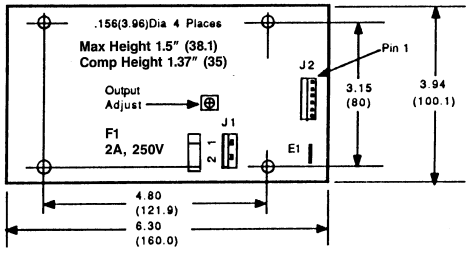
The NFS50-7608 is also available with vertical Molex connector, designated NFS50-7608M. Electrical specifications are the same with the exception that the third output (12 V) is floating. The auxiliaries can therefore be configured as + 12≥ + 12 V, +12≥ – 12 V, or +24 V. When used to provide +24 V output we recommend fitting a 1N4001 diode across the isolated 12 V O/P to prevent damage to the 12 V regulator.

Pin Connections

J1	NFS50-7608	NFS50-7601
Pin 1	AC Neutral	AC Neutral
Pin 2	AC Live	AC Live
J2		
Pin 1	12 V Return	–12 V
Pin 2	12 V (Floating)	–5 V
Pin 3	+12 V	+12 V
Pin 4	+5 V	+5 V
Pin 5	Return	Return
Pin 6	Return	Return

Safety Covers available

NFS50 – 7608M/7601



AC Mating Connector as NFS50-7608
DC Mating Connector – Molex 09-91-0600 with Molex 08-50-0105 crimp terminal
Mating Connector kit available, order Part No. **NFS42/50 CON KIT**

OUTPUT VOLTAGE & CURRENT RATINGS - 75 & 110 WATT MODELS

Maximum Power[1]	Output Voltage	Output Currents				Ripple P-P[4]	Total Regulation[5][6]	Model Number
		Minimum	Maximum[1]	Maximum[2]	Peak[3]			
75 W	+5 V	2.0 A	5.0 A	5.0 A	10.0 A	50 mV	±1%	NFS75-7608
	+12 V	0.5 A	3.0 A	3.0 A	6.0 A	120 mV	±5%	
	–12 V	0.0 A	1.0 A	1.0 A	1.5 A	120 mV	±5%	
110 W[1]	+5 V (A)	1.0 A	8.0 A	12.0 A	20.0 A	50 mV	±2%	**NFS80-7602**
	+24 V (B)	0.0 A	2.0 A	2.5 A	3.0 A	240 mV	+10%/–5%	
	+12 V (C)	0.0 A	2.5 A	3.0 A	6.0 A	120 mV	±3%	
	12 V (D)[8]	0.0 A	2.5 A	3.0 A	6.0 A	120 mV	±3%	
110 W[1]	+5 V (A)	1.0 A	8.0 A	12.0 A	20.0 A	50 mV	±2%	**NFS80-7606**
	+24 V (B)	0.0 A	2.0 A	2.5 A	3.0 A	240 mV	+10%/–5%	
	+15 V (C)	0.0 A	2.5 A	3.0 A	6.0 A	150 mV	±3%	
	15 V (D)[8]	0.0 A	2.5 A	3.0 A	6.0 A	150 mV	±3%	
110 W	+5.1 V	0.0 A	8.0 A	10.0 A	20.0 A	50 mV	±2%	**NFS110-7601P***
	+12.0 V	0.0 A	4.5 A	5.0 A	9.0 A	120 mV	±3%	
	–12.0 V	0.0 A	0.5 A	1.0 A	1.5 A	120 mV	±3%	
	–5.0 V	0.0 A	0.5 A	1.0 A	1.5 A	50 mV	±3%	
110 W	+5.1 V (A)	0.0 A	8.0 A	10.0 A	20.0 A	50 mV	±2%	**NFS110-7602P***
	+24.0 V (B)	0.0 A	3.5 A	4.5 A	4.5 A	240 mV	+10%/–5%	
	+12.0 V	0.0 A	4.5 A	5.0 A	9.0 A	120 mV	±3%	
	–12.0 V	0.0 A	0.5 A	1.0 A	1.5 A	120 mV	±3%	
110 W	+5.1 V	0.0 A	8.0 A	10.0 A	20.0 A	50 mV	±2%	NFS110-7604P*
	+15.0 V	0.0 A	4.0 A	5.0 A	7.5 A	150 mV	±3%	
	–15.0 V	0.0 A	0.5 A	1.0 A	1.5 A	150 mV	±3%	
	–5.0 V	0.0 A	0.5 A	1.0 A	1.5 A	50 mV	±3%	
110 W	5.1 V	0.0 A	16.0 A	20.0 A	22.0 A	50 mV	±2%	NFS110-7605*
110 W	12 to 14 V	0.0 A	7.0 A	9.0 A	9.0 A	120 mV	±2%	**NFS110-7612***
110 W	15 to 18 V	0.0 A	5.0 A	7.3 A	7.3 A	150 mV	±2%	NFS110-7615*
110 W	24 to 30 V	0.0 A	3.5 A	4.5 A	4.5 A	240 mV	±2%	**NFS110-7624***

Medical Approved versions available on models marked with *– replace – 76xx with – 79xx

1. Natural convection cooled, 80 W maximum.
2. Forced air, 20 CFM at 1 atmosphere, 110 W Maximum.
3. Peak output current lasting less than 60 seconds with duty cycle less than 10% total peak power must not exceed 75 W/110 W.
4. 50 MHz bandwidth, peak to peak, measured differentially.
5. Total Regulation is defined as the static output regulation at 25 °C, including initial tolerance, line voltage within stated limited, load current within stated limits, and output voltages, adjusted to their factory settings.
6. For 7602 model I(A)/I(B) <5.0 for stated regulation on +24 V output. The +24 V output will maintain ±5% regulation if I(A) ≤5 A.
7. MTBF 50,000 hrs (NFS 75), 125,000 hrs (NFS 80 & NFS 110) with 11 W min load.
8. Output D is floating and must be referenced as positive or negative, by connecting to common 0 V pins 4-7.

MECHANICAL DETAILS – 75 & 110 WATT MODELS

NFS75 Model

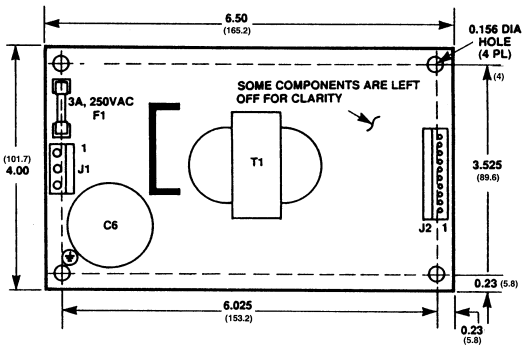
Pin Connections

J1	NFS75-7608
1	NEUTRAL
2	LIVE
3	GROUND
J2	
1,2	+5 V
3,4	0 V
5	–12 V
6,7,8	0 V
9,10	+12 V

AC Mating Connector is Molex 09-91-0500
DC Mating Connector is Molex 09-91-1000
Crimp Terminals – Molex series 2878
No Safety Cover available

NFS75 & NFS110

Overall height is 1.9 max (48.3)
Dimensions in inches (mm)



NFS110 Model

Pin Connections

J1	NFS80-76XX	NFS110-MULTI	NFS110-SINGLE
1	GROUND	GROUND	GROUND
2	NEUTRAL	NEUTRAL	NEUTRAL
3	LIVE	LIVE	LIVE
J2			
1,2,3	+5 V	+5 V	+ OUT
4,5,6,7	0 V	0 V	0 V
8,9	+12 V/+15 V	+12 V/+15 V	+ OUT
10	-12/-15 Ret*	P.F.	N.C.
11	-12 V/-15 V*	–12 V/–15 V	N.C.
12	key	key	key
13	+24 V	–5 V/+24 V	N.C.

* Pins 10 and 11 are floating output, which can be referenced as +ve or –ve. Pin 10 is +ve with respect to pin 11. Either pin must be connected to 0 V (pins 4-7) for proper operation.
AC mating connector is Molex 09-91-0500
DC mating connector is Molex 09-91-1300 Crimp Terminals – Molex Series 2878